

ServiceInsights

FOR INDEPENDENT SERVICE CENTERS

ACDelco

Genuine  **Parts**

April-June 2010

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See Work in Progress.

'70 Chevelle SS

Goes from Base Stock Car
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to 430 Horse Show Car.

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- > New and improved transmission fluid replaces Dexron III
- > Program offers head to head pricing on 200 GM Engine and 400 GM Transmission part numbers
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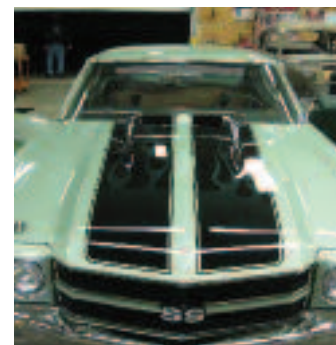
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Genuine  | **Parts**

GM Performance Parts

Crate Engines



GM Performance Parts crate engines offer uncompromised performance, plug-and-play installation, and an unmatched value. How can you go wrong? Don't waste your time and money rebuilding a tired, old engine.
- 2-year/50,000 miles* limited warranty
(*Warranty covers both parts and labor)

290 HP 350 Crate Engine
Great option for truck or car
engine replacement!

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GM ServiceInsights Online

More Genuine GM Parts
resources and links.

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Product Update

SHOP GM PERFORMANCE PARTS

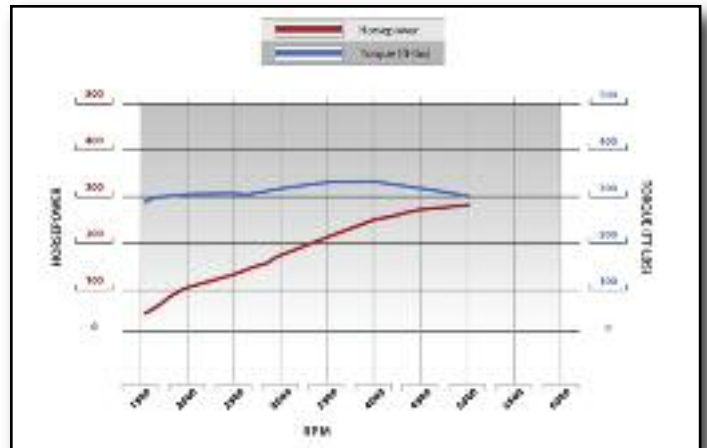
FOR THE PROVEN AND THE NEW

With spring in the air and open road beckoning, GM performance car-lovers may be thinking about powertrain makeovers. If you count some of them among your customers, GM Performance Parts has some products that might make some hearts skip a beat or two.

One good choice might be the 350/290HP #12499549. Offering outstanding performance and value, it's the best-selling small block in the GMPP lineup. It can be a better bet than a costly rebuild, and it offers all the power needed: 290 HP @ 5,100 rpm and 320 lb-ft of torque and 3,750 rpm.



The new 350/290HP #19244450 offered from GMPP is also offered as a deluxe crate engine. It includes an aluminum intake manifold and an attractive chrome dress-up kit consisting of chrome valve covers, chrome air cleaner, chrome timing chain cover and chrome breather cap.



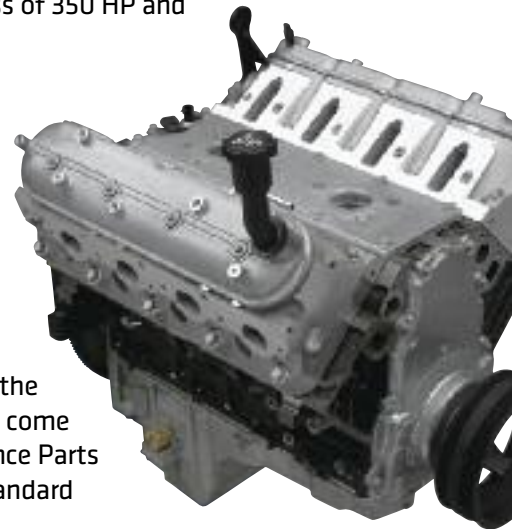
350/290HP Dyno Chart

Another can't-miss crate engine solution is the enhanced LS327 (5.3L) #19165628. With a newly available performance camshaft and Graftal-coated pistons, this engine that builds on the legendary Chevrolet small-block V-8 cranks out in excess of 350 HP and 340 lb.ft. of torque.

The package, which includes a carbureted intake manifold, gaskets and bolts, and ignition coils, brackets and plug wires, is a simple, yet powerful introductory LS engine for any street project.

Both the LS327 and the 350/290HP #19165628 come with the GM Performance Parts 2-year/50,000-mile standard warranty.

And what good would it be to show off an LS-series engine without the finishing touches? GMPP's new collection of LS valve covers give the perfect performance look and feel that any project car demands.



GM Performance
Parts LS327
Crate Engine

Continued on page 4.



Product Update (cont'd.)

Seven styles are available in a mix of natural, polished and chrome finishes, and callouts are available for favored nameplates and vehicles. Nothing finishes off your engine like a great-looking set of valve covers straight from GM.



They're designed and built to production specifications and include a production-type O-ring gasket for a leak-free fit.

Nameplates include two Corvettes (red and black lettering) and one each for generic Chevrolet, Camaro, Pontiac and GM Performance Parts/LSX.

The GMPP Commitment

GM Performance Parts crate engines undergo extensive full-power engine dynamometer validation that requires the engines to perform from peak horsepower to peak torque. That commitment to quality and durability enables General Motors to back GM Performance Parts crate engines with a 24-month/50,000-mile warranty (whichever occurs first). All GM Performance Parts components carry a 12-month/12,000-mile warranty.

To shop for GMPP products, or for more information, contact your GM Dealer or visit www.gmperformanceparts.com.

Replacement for DEXRON®-III

New and improved DEXRON transmission fluid available

The best transmission fluid for GM vehicles has gotten better. A new-generation DEXRON® product – DEXRON®-VI ATF – is now available to offer even better protection for all Hydramatic transmissions in GM vehicles.

Replacing DEXRON®-III, the new GM-branded and – approved fluid offers improved performance in a number of key areas, making it the new best choice for virtually all GM vehicles.

The new product delivers on all of the criteria for transmission performance and protection, assuring shops and vehicle owners that GM transmissions will operate properly.



Higher Performance, Better Wear

The result is more consistent shifting performance, from less clutch shudder in modulated torque converters to smoother shifting during low temperature operation. And it also translates to better wear protection. There's less sludge and deposit formation, improved oxidation and thermal stability and less wear on bushings, bearings and gears due to enhanced foam control.

DEXRON®-VI is not just a bit better; it's a vast improvement, offering 200 percent more shear stability, 150 percent better foam/aeration, 120 percent better clutch durability and two-fold improvement in clutch friction stability and fluid oxidation.

With the release of the product, shops should use it in 2005 and prior GM vehicles that now use the earlier generation fluid. And vehicles 2006 and newer, DEXRON®-VI must be used. It is fully back serviceable for DEXRON –III, III (H) and IIE applications and meets GM specification GMN10060.

Repair Industry News & Updates

Genuine GM Parts Powertrain **overPOWER** Program Targets Aftermarket

If price has ever stood in the way of you choosing GM OE Engines and Transmissions for your customers, it's about to change.

The new overPOWER program includes over 200 Engine and 400 Transmission part numbers from Genuine GM Parts now available with incredible savings from your GM Dealer.

This new conquest program is designed to meet the aftermarket competition head-on with GM quality, and aggressive pricing. overPOWER makes it easier than ever to make the best powertrain choice for you and your customer.

Start Saving with your GM Dealer

When you have a repair or replacement job, make your GM Dealer your first and last call. The overPOWER program gives GM Dealers the power to sell engines and transmissions at prices most of the aftermarket competition can't best. If you already have an aftermarket quote, call your GM Dealer and put the overPOWER program to the test for yourself.

The program is ideal for ISCs who want to give their customers the superior design, performance, warranty and support that comes with every GM Powertrain product. Those are the features your customers value most when looking for replacement powertrain.

While the GM lineup of eligible products includes both new and remanufactured engines and transmissions, in many cases a new GM engine can come in at a price that's competitive with an aftermarket reman.



Associated Parts Covered

The overPOWER program also extends to associated parts. To assist in making quality GM Parts a value proposition on your engine and transmission installs, your dealer can discount \$50 off your associated parts order. Call your GM Dealer for details

and/or to place an order. Since its unveiling as a pilot program last November, overPOWER has caught on with more GM Powertrain dealers. The number of qualifying engines and transmissions has grown to the point where most of the high-volume, in-demand products are included. The GM Performance Parts 427 Anniversary Engine is also included in the program.



Repair Industry News & Updates (cont'd.)

Automotive Service & Repair Week

Gets Its Own Spotlight

The days of automotive service and repair professionals getting lost in the shuffle of the annual Automotive Aftermarket Industry Week (AAIW) events in Las Vegas are ending.

This year, the International Autobody Congress & Exposition (NACE) and the Congress of Automotive Repair & Service (CARS) events, which comprise Automotive Service & Repair Week (ASRW), will be staged in October at the Mandalay Bay Convention Center.



For the last three years ASRW has been staged under the broader aftermarket parts and service industry umbrella of AAIW, held each November. This year, collision repair and automotive service professionals only will gather Oct. 11-13 (Monday-Wednesday) for traditional educational sessions and product- and service-vendor expositions. ASRW also incorporates Auto Glass Week, dedicated to the automotive glass professional.

ASRW sponsor Automotive Service Association (ASA) says moving CARS and NACE to its own time slot will ultimately serve the industry better. ASA President Ron Pyle says a stand-alone ASRW will allow for more focus on

matters of interest to service professionals and will appeal to a broader cross-section of the automotive repair industry.



"We're pleased that our plans to produce a dedicated event for all automotive service and repair professionals, regardless of industry affiliation, business model, specialty or discipline, have finally come to fruition," he says. "Our mission is to make ASRW the only destination necessary to address the needs of the professional service and repair community."

Genuine  | Parts

Look for the Genuine GM Parts
Exhibit at NACE
Oct. 11-13
at the Mandalay Bay
Convention Center, Las Vegas
naceexpo.com

Fine Tuning Engine Performance

with Variable Valve Timing

As emissions standards continue to grow stricter, more devices have been added to vehicles to decrease pollutants, ranging from the catalytic converter to exhaust gas recirculation (EGR) and variable valve timing (VVT). Many of these innovations have focused only on emissions; however, variable valve timing has provided a way to help control major pollutants while increasing torque and horsepower through finer control of engine operation.

At engine combustion chamber temperatures above 2500°F, nitrogen mixes with oxygen to form oxides of nitrogen (NOx), a major contributor to smog. Because each cylinder experiences combustion temperatures well above that level, a goal for all automotive manufacturers has been to reduce combustion temperatures.

The use of an EGR valve was an early method for reducing the formation of NOx. Exhaust gas is reintroduced into the intake manifold through a valve, diluting the intake charge and effectively reducing combustion chamber temperatures and the formation of NOx. A side effect of introducing external EGR to reduce NOx is that it causes the hydrocarbon (HC) levels to increase.

Internal EGR

A more effective method of controlling emissions is to increase intake and exhaust valve overlap, a version of

internal EGR. Valve overlap refers to the amount of time in the four-cycle engine event when both the intake and exhaust valves are open. A reversion occurs in the cylinder as the piston is moving down while both valves are open. Exhaust gas is drawn back into the cylinder, simulating an EGR function. Being able to control the length of this event can substantially lower NOx. HC levels are also reduced by re-burning the tail of the exhaust event that is rich in hydrocarbons. However, placing the camshafts in a permanently increased overlap position would affect idle and low rpm performance. The greater the overlap, the lower the intake manifold vacuum levels.

Fixed camshafts compromise between smooth idle, good low-rpm torque and high-rpm power. But variable camshaft timing accommodates the sometimes divergent needs for power, driveability, economy and emission control.

Variable valve timing uses a cam phaser to dynamically change valve timing events relative to piston timing by controlling the camshaft. This allows the position of the camshaft to be changed, dependent on need. At idle and low engine load, overlap is minimum, improving idle quality. At higher engine speed and load, overlap is increased, allowing emissions to decrease.

The cam phaser allows the PCM to change the relationship of the camshaft relative to the crankshaft, permitting better control over emissions and performance.

Splined Phaser

Early cam phasers used a splined phaser, which uses an internal piston that connects the exhaust camshaft and cam phaser sprocket together using helical splines, forming an adjustable mechanical link. The swivel action of the cam phaser (or Exhaust Camshaft Position Actuator) is accomplished via oil pressure applied by an oil control solenoid into the actuator's piston in the hub of the camshaft sprocket.

A PCM commanded control valve manages the oil pressure to the cam phaser internal piston. The internal piston rides along the helical splines, rotating the cam phaser gear and the camshaft opposite of each other, changing cam timing.

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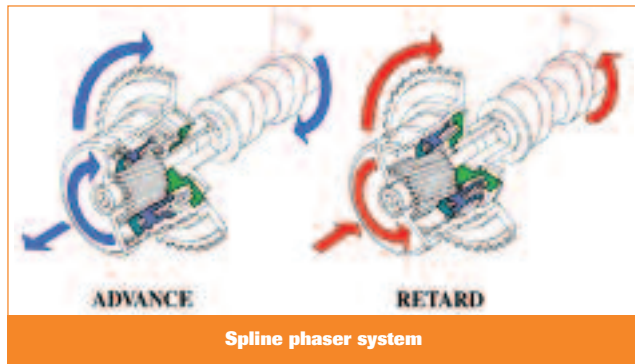
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ON THE WEB

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Variable Valve Timing – continued from page 1



A spring within the cam phaser holds the piston in an advanced position (0°) when no oil pressure is applied. This allows the engine to start and run with the cam in the home position. When cam phasing is desired, the PCM can retard the cam position up to 25° (50° of crankshaft angle) by varying oil pressure to the piston through the control valve.

Vane Phaser

Later VVT systems on some twin-cam engine designs use a vane phaser on each camshaft. Inside the vane-style actuator assembly are a rotor and stator that are not mechanically linked together. Instead, oil pressure is controlled on both sides of the vanes of the rotor, giving a hydraulic link to the stator. Varying the balance of oil pressure on each side of the vanes is how the cam is phased.



At idle, the exhaust cams operate at full advance, for minimum valve overlap. Optimizing valve overlap eliminates the need for a separate EGR system and air injection reaction (AIR).

The camshafts are driven by a roller chain. A hydraulically operated tensioner keeps proper tension on the chain, even as it stretches with mileage (a normal occurrence in all chains), which eliminates need for periodic replacement or adjustment. The cams operate directly on roller-finger followers, which actuate the valves.

A return spring sits under the reluctor of the actuator to help keep it at a 0° (home) position. The actuator contains two cavities for oil to flow into to either retard or advance the cam. The four-way

PWM oil control valve (OCV) controls which cavity receives pressurized oil.

New vane phaser systems feature an electromagnetic coil situated on the oil control valve, mounted directly on the front of the camshaft.

Intake Camshafts

Exhaust cam phasing benefits are reduced emissions and greater fuel economy, however, intake cam phasing provides increased low-end torque and high-end power.

Instead of moving the intake cam to effect overlap in the exhaust stroke, intake closure is delayed at the bottom of the intake stroke. At lower speeds, an open intake valve during the first few



degrees of compression can lead to air being pushed back out the intake valve as the piston moves upward. But at higher speeds, the open intake valve allows the air that's been moving into the cylinder to keep coming in under the momentum the air charge has acquired. The result is a cylinder with greater volumetric efficiency.



Overhead-cam engines that phase both intake and exhaust cams use a vane phaser. Pushrod engines with variable valve timing on their single-cam-in-block engines also use a vane phaser, but these engines differ from overhead-cam engines in that they push the oil control solenoid back into a hollow portion of the front of the camshaft. Four small oil holes are situated in the camshaft to line up with the oil control valve/solenoid.

– Thanks to Mike Militello

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ACDelco service tips are intended for use by professional technicians, not a "do-it-yourselfer." They are written to inform those technicians of conditions that may occur on some vehicles, or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions and know-how to do a job properly and safely. If a condition is described, it cannot be assumed that the information applies to all vehicles or that all vehicles will have that condition.

All materials and programs described in this magazine are subject to change. Submission of materials implies the right to edit and publish. Inclusion in the publication is not necessarily an endorsement of the individual or the company.

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The A/C Climate Protection Pledge

It seems that the marketplace is finally ready to be green. When it comes to vehicle air conditioning service, potential customers are looking for service centers that have highly trained technicians and the proper equipment to provide environmentally friendly air conditioning service.

The Mobile Air Conditioning Society (MACS) Worldwide and the U.S. Environmental Protection Agency have developed the Automotive A/C Climate Protection Pledge to help qualifying service centers be recognized for their environmental leadership in performing proper environmental mobile A/C service.

American interest in the environment has grown recently. According to the 2009 Cone Consumer Environmental Survey:

- 35% of Americans have higher interest in the environment today than they did one year ago
- 35% of Americans have higher expectations for companies to make and sell environmentally responsible products and services
- 70% of Americans indicate that they are paying attention to what companies are doing with regard to the environment today

Service centers completing the Automotive A/C Climate Protection Pledge commit to:

- Use required tools and equipment
- Train technicians in Best Practices
- Promote repairing of leaks and discourage recharge of leaking systems



- Certify that all contaminated refrigerant collected is sent to a certified reclaimer
- Set continuous improvement goals
- Allow EPA to review pledge-related publicity materials (signs, press releases, advertisements, etc.) before they are released
- Upgrade R/R/R equipment, leak detectors
- Establish a tool and equipment maintenance program
- Establish a procedure for removal of refrigerant heels
- Train service writers or others who greet customers to explain the economic and environmental advantages of having leaks repaired rather than just having the A/C system "topped off"

Required Equipment

- SAE J2788 RRR Equipment
- Refrigerant Identifier
- Electronic Leak Detector
- Ultraviolet Dye Leak Detecting System
- R134a Manifold Gauges
- Vacuum Pump (stand-alone or built into R/R/R equipment)
- Temperature Measuring Devices (digital thermometer, digital pyrometer, infrared thermometer)
- Hose Repair Crimping Tool (if shop makes own hose assemblies)
- Spring Lock Coupling Service Tools
- A/C Fitting Service Tools
- Orifice Tube Service Tools
- Service Information Resources (manuals, specification books, computerized information, etc.)

Technician Training

All A/C technicians are encouraged to complete a self-study training program focusing on best practices for leak detection, service and repair, and refrigerant conservation. These practices are designed to promote shop savings and efficiency, consumer satisfaction and environmental protection.

The Best Service Practices Study Course booklet, additional training information, A/C service pledge exam and the pledge application are available on the MACS website at www.macs.org.

Take the Pledge

To take the Climate Protection Pledge

1. Go to www.macs.org and click the Climate Protection Pledge link to download the Best Service Practices Study Course. (All A/C technicians should study this booklet).
2. Log in to the MACS website to take the Auto A/C Climate Protection Pledge Exam and Pledge. (If you're not a member, log in and create a profile.) There is no charge for the exam.

If you have met the requirements, you will be notified, your shop will be added to a "shop locator" list available to mobile A/C repair customers and you will receive information on how you can promote the U.S. EPA's recognition to mobile A/C repair customers.

ASE Certification Tests

Summer 2010 Computer-Based Tests

Registration: July 9 – August 16, 2010

Register by phone ONLY: 1-800-525-6929

Testing Dates: July 16 – August 23

Computer-Based Tests Offered

Automobile	A1-A8
Advanced Automobile.....	L1
Auto Parts	P2
Auto Service Consultant.....	C1
Med/Heavy Truck	T1-T8
Collision	B2-B6

Go to **www.ase.com** for more information.

Battery Charging Guidelines

A customer with a “bad” battery typically expects something to be done about it immediately. The customer may not understand that the battery may be “good” but simply discharged. Customers who want to get back on the road quickly may demand a new battery under warranty.

There are two things wrong with this approach. First, if the battery is otherwise serviceable, it may only need a recharge to return it to health. Second, unless the cause that discharged the battery is resolved, neither a new battery nor recharging the original battery will solve the real problem.

The technician’s job is to recharge the battery quickly and safely, and determine and repair the cause of the battery becoming discharged.

Testing a battery using a conductance-type tester can determine if the battery is good and can be recharged.

Charging Ahead

Battery charging involves applying sufficient voltage to the battery to cause current to flow through the



Conductance testers can accurately measure the performance of a battery in service.

battery. Charging causes a chemical change in both the battery’s plates and the electrolyte. If the battery is simply discharged, but otherwise good, applying a suitable current for enough time will eventually fully charge the battery as much as is

chemically possible. However, continued application of current can lead to overheating, loss of electrolyte and shortened battery life.

The charging process requires time and current. Multiply the charging rate in amperes by the number of hours and the result will be the ampere-hours of charge applied to the battery. To bring a battery to full charge will require roughly the same number of ampere-hours at a low charge rate as it does at a high rate. Put another way, a

higher rate will take less time.

Since most customers like to have their vehicles returned quickly, it’s desirable to get the charging job done quickly by using a high charge rate.

State of Charge

It’s not possible to measure a battery’s state of charge in ampere-hours, so another method must be used. Open circuit voltage (OCV), measured across the battery’s terminals, relates to the battery’s state of charge. The voltmeter must be capable of reading to the nearest 0.01 volt.

If the battery has not been charged or used (the engine started or the vehicle driven) in the last 12 hours, a reading may be taken.

If the battery has been discharged and recharged or used within the last 12 hours, connect a carbon pile and load the battery at 300 amperes for 15 seconds. Remove the load. Wait 15 seconds and then take the reading.

The OCV reading is accurate +/- 10%. A battery with a state of charge of 65% or greater is marginally charged enough to be returned to service. However, if the vehicle will be used in slow traffic or short drive times, or in very cold or very hot conditions, the battery should be at least 90% of full charge before returning to service.



Automatic Battery Chargers

Advancements in battery charging technology now combine diagnostics and charging control systems that monitor and automatically regulate the charging process. These controls maximize the chargers output based on the battery status, while protecting the battery from overcharge. This means you can use chargers with the highest output ratings, so long as the charger makes the necessary adjustments as the battery approaches full charge.

Automatic battery chargers such as the Midtronics GR1, Associated Intell/Matic Pro or the Cristie PDQ can return a good, but discharged, battery to at least 85% state of charge in 20 to 40 minutes.

Manual Battery Chargers

Non-automatic battery chargers do not offer the self-limiting features of the latest equipment. It is the operator’s responsibility to control the charging process.

continued on page 5

State of Charge			
OCV (conventional flooded-cell battery)	OCV (AGM battery)	% charge at 32°F (0°C)	% charge at 75°F (25°C)
12.75	12.8	100%	100%
12.70	—	100%	90%
12.60	—	90%	75%
—	12.6	100%	75%
12.45	12.4	75%	65%
12.20	12.3	65%	45%
12.00	12.1	40%	20%

Monitor both charging current and voltage every 30 minutes. Because voltage is not held constant, it will rise as the battery becomes charged.

When voltage reaches 16 volts, reduce the charging current to 5 amperes. When the voltage reaches 16 volts again, at the 5 amp current, the battery is fully charged.



Midtronics GR1 automatic battery charger

Dead Cold

A completely discharged battery will take more than twice as long as a half-charged battery to bring the battery to a usable state of charge. The electrolyte in a discharged battery is largely water, which is a poor conductor. The battery may accept such a small amount of current at first that it appears not to take a charge.

Also, chemical reactions in a battery are slower at low temperatures, so a very cold battery will take longer to charge than one at room temperature.

AGM Batteries

The Absorbent Glass Mat (AGM) battery uses absorbent glass mats to hold a small amount of electrolyte in contact with the plates. The battery uses a gas recombinant technology, where the gases produced at the plates are recombined to form water before they escape. This battery design offers high power for lower weight and is more resistant to high temperatures, vibration and cycling.

The AGM battery may be charged using an automatic battery charger, as long as the charger automatically adjusts the charging current as the battery nears full charge.

When using a conventional charger, limit the rate to 10 amperes or less. Do not allow the battery to charge at 3 amperes or more for longer than 10 hours, or 10 amperes for longer than 5 hours. When these limits are reached, allow the battery to stand overnight, and then resume charging if further charging is required.

Check the voltage every 30 minutes and remove the battery from charge when the voltage reaches 15 volts at 3-10 amperes. The state of charge should be at 90-95%.

Refer to GM bulletin #02-06-03-009C for additional information on battery charging.

—Thanks to Mike DeSander

Remanufactured Rotating Electrical Product Upgrades

The ACDelco brand stands for quality. To further enhance that reputation in the remanufactured rotating electrical aftermarket, ACDelco has announced product upgrades to Line 33 Alternators and Starters.

On many top selling parts in the remanufactured product line, ACDelco will use 100% new regulators on alternators and 100% new solenoids on

starters. These product upgrades make ACDelco the only brand using 100% new regulators and solenoids in our most popular remanufactured parts.

New Quality Label

The upgraded product will be easy to identify with the addition of a gold quality sticker applied to the top of the box.

The upgraded products will be shipped automatically as new orders for alternators and starters are processed.

Root Cause

When making repairs on rotating electrical systems, in-depth diagnosis is needed before parts replacement, including checking other components and conditions that might affect system performance, such as any Diagnostic Trouble Codes, battery health and fluid contamination

Fluid contamination is often the root cause of the failure of starters. For instance, oil intrusion into a starter will degrade the brushes to the point where they will not make good electrical contact with the armature/commutator. Inspect the old starter; if it appears to be oil soaked, repair the source of the leak (i.e. valve covers, intake valley, etc.). Fixing the oil leak will reduce the chance of a customer comeback.

More Information

For more information on how to prevent early failures of alternators and starters, check out the Comeback Prevention seminar (S-DS11-01.01SEM).

To learn more about the latest technology used in modern charging and starting systems, attend the Advanced Charging and Starting Systems Diagnostics seminar (S-EL06-20.01SEM).

Contact your local ACDelco distributor to learn when a seminar will be held in your area.

—Thanks to Bob Malone



Controlling Diesel Emissions

The latest U.S. EPA diesel emission regulations were designed to combat diesel pollution and obtain gasoline-like emissions standards from diesel-powered vehicles.

To achieve these goals, all diesel engines produced since 2007 must meet a reduction of nitrogen oxide (NOx) and hydrocarbons (HC) by 50% and particulate matter by 90+% over earlier 2004 emission standards.

In addition, Ultra-Low Sulfur Diesel (ULSD) fuel must have a 97% reduction in the sulfur content of highway diesel fuel. According to the EPA, some studies show that the use of ULSD alone can reduce particulate matter emissions by between 10-20%. However, of greater significance is that this cleaner fuel enables the use of advanced after-treatment technologies on new engines.

Emissions Control Technologies

Some of the emissions control technologies of the Duramax 6.6L diesel engine in Chevrolet and GMC light-duty trucks and vans and medium-duty trucks include a Diesel Oxidation Catalyst (DOC) and a Diesel Exhaust Particulate Filter (DPF).

The DOC reduces hydrocarbons and oxides of nitrogen, carbon monoxide and odor-causing compounds. It also turns the majority of emissions into water and oxygen.

The DPF traps the particulate matter (solid particles that appear as black smoke) from the engine exhaust before they can be emitted into the atmosphere.

The DOC and DPF are installed in the exhaust system. To prevent clogging, particulate matter in the DPF is periodically burned off, leaving ash and yielding carbon dioxide and water. This process is called particulate filter regeneration.

DPF Regeneration

DPF regeneration may occur under several circumstances, called Active Regeneration, Passive Regeneration and Service Regeneration.

Active Regeneration – The regeneration operation is controlled by the engine control module (ECM), which keeps track of the mileage driven, the amount of fuel consumed, the hours of operation and the exhaust differential pressure.

When the conditions are met for regeneration to occur, the ECM enters a different engine calibration strategy that includes additional fuel injection pulses. This heats the DOC above its normal operating temperature and regeneration begins. For the process to complete satisfactorily and efficiently clean the filter, the vehicle must be operated continuously for approximately 18 minutes at speeds greater than 30 mph (50 km/h). If the engine is allowed to return to idle during this time, the idle speed may be elevated slightly and the operating sound may be different. This is normal, and the driver doesn't need to do anything.

During regeneration, the exhaust temperature increases (greater than 500° C), which converts the particulates into harmless gases and ash. The DPF is then clean and ready to filter particulates again.

If normal driving does not provide the necessary conditions for regeneration to occur, the pressure differential continues to increase across the exhaust filter. On some vehicles, a Clean Exhaust Filter message will be displayed or a warning lamp will illuminate.



If the conditions necessary for regeneration do not take place, however, the ECM will eventually illuminate the MIL and the Reduced Power warning lamp. The engine enters the Reduced Power mode, which will require the vehicle to be serviced.

Passive Regeneration – Passive regeneration occurs when exhaust gas temperature is elevated above 300°C (575° F). These temperatures may be reached when the engine is under heavy load.

Service Regeneration – Service regeneration is performed with the scan tool and is used to clean a soot-loaded filter during a service visit.

Regeneration Temperatures

The exhaust system has been designed to deal with the temperatures involved in the regeneration process. On long wheelbase models, for instance, a heat shield protects the rear axle shock absorbers. All models have an exhaust cooler at the end of the tailpipe. A vacuum created by the exhaust passing through the openings draws in cool air, which mixes with the exhaust gases.

There are times when a DPF service regeneration must be performed in the service center. This must be conducted outdoors. The shop exhaust system will not handle the heat.

Diesel Fuel and Oil Requirements

The Duramax 6.6L diesel engine requires Ultra-Low Sulfur Diesel, which limits sulfur content to 15 ppm (parts per million).

It also requires oil that conforms to the CJ-4 standard established by the American Petroleum Institute. This oil offers lower oil consumption and reduces limits for phosphorus, sulfur and ash. Low ash oil is needed to extend the life of the DPF as well as to reduce the formation of engine sludge and deposits.

– Thanks to Frank Tornambe



The following technical tips provide repair information about specific conditions on a variety of vehicles. If you have a tough or unusual service repair, the **TSS Technical Assistance Hot Line** can help. Call **1-800-825-5886, prompt #2**, to speak with a technical expert with the latest OEM information.

Fluid Flushing Requirements

2005-2010 Chrysler, Dodge and Jeep vehicles

Chrysler Group vehicle fluid systems do not require regular flushing. These systems include: engine oil, transmission oil, axle lube, brake fluid, power steering fluid, and refrigerant. The only exception to this requirement are those fluid changes that are published in the vehicle maintenance schedules, e.g. engine coolant, and in instances where a failure has occurred and/or the system has become compromised, contaminated or overheated beyond the normal operating range.

Aftermarket chemicals to flush the engine, transmission, brake or steering systems are not recommended. Chemicals contained in these products can damage the system elastomeric components, and contaminate the component fluid, leading to loss of system/component durability and service life. When necessary, only the original approved system fluid should be used to flush these components using approved equipment.

If the engine coolant contains a considerable amount of sediment, clean and flush the system followed by a thorough rinsing to remove all deposits and chemicals. Refill with a minimum of a 50% mixture of the specified coolant and distilled water.

Refer to Chrysler bulletin #26-001-09 for more information.

OnStar® Power Consumption

2000-2010 OnStar-equipped Vehicles with Digital Hardware

During battery parasitic drain testing, it is important to understand the power cycles of the various OnStar systems in order to avoid confusion about normal power consumption readings.

All OnStar customers with currently active vehicles have digital/analog cellular capability. A green status LED on the OnStar keypad normally indicates an active OnStar account. A red LED indicates a system DTC. On Gen 6

and later systems, a clear or "dark" LED may indicate the OnStar system has been deactivated or may possibly



have a no power concern/no communication.

The OnStar system will stay powered up after the ignition is off for an extended time in order to allow for remote services like door unlock, horn chirp, light flash, etc., to take place as requested by the driver. Power cycle times vary depending on the generation of the OnStar system, and may be powered up continuously from 48 hours to 120 hours after the ignition is off. Technicians may identify the system generation by using a scan tool or by using www.onstarenrollment.com.

The expected current draw of the OnStar module is:

IGN ON - 240 to 400 mA

IGN OFF - 3 to 20 mA for 48 hours

IGN OFF - after 48 hours (120 hours on specified VCPs) - 0.2 to 0.8 mA

Squeak Noise from Rear of Vehicle

1999-2007 Chevrolet Silverado (Classic), GMC Sierra (Classic); 2007-2009 Chevrolet Colorado, Chevrolet Silverado, GMC Canyon, GMC Sierra, HUMMER H3, HUMMER H3T

A squeak noise may be coming from the rear of the vehicle. During normal operation, certain vehicles may exhibit a squeaking noise that may be traced to the rear leaf springs. While this noise is an operating characteristic of leaf springs, the roads that the vehicle is driven on will affect the frequency and severity of this noise.

This condition may be due to debris getting between the leaf springs. It has been found that the application of

grease to the rear leaf springs will correct this condition and do a better job of preventing the noise from reoccurring than replacement of the springs.

To grease the springs, pressure wash the springs to remove as much dirt and debris as possible and dry the springs with compressed air.

Apply a liberal amount of grease under the front and rear tip inserts for the #2 and #3 leaves, on top of the tip inserts, and in between the #1 and #2, and #2 and #3 leaves.

Periodic cleanings and grease re-application may be necessary throughout the life of the vehicle.

If this procedure does not correct the noise on 1500 Series (1/2 ton) models built prior to October 2004, the noise may be caused by an incorrectly dimensioned splay clip (the band holding the ends of the leafs together) that interferes with the leaf springs. A 5 mm (0.197 in) wider splay clip was introduced early in the 2005 model year to provide additional clearance. To correct this condition, it may be necessary to replace the rear leaf spring assembly. There was no change to the part number.

For more information, refer to GM bulletin # 06-03-09-004B.

Diagnostic Assistance

For free technical diagnostic assistance and product information regarding specific ACDelco products, contact these toll-free information hotlines staffed by ASE-certified technicians:

Brakes – 1-888-701-6169 (prompt #1)

Chassis – 1-888-701-6169 (prompt #2)

Clutches – 1-888-725-8625

Lift Supports – 1-800-790-5438

Shocks – 1-877-466-7752

Starters and Alternators –
1-800-228-9672

Steering – 1-866-833-5567

Wiper Blades – 1-800-810-7096

How to Take ACDelco Training

Go to www.acdelcotechconnect.com and click on the **Training** tab to log on to the ACDelco Learning Management System (LMS).

- To enroll in an **Instructor-Led Training (ILT)** course, click on the Enrollment link or the Instructor-Led Courses link.
- To launch a **Web-Based Training (WBT)** course, click on the Web-Based Courses link to view the catalog and select a specific course.
- To launch a **TechAssist (TAS)** course, click on the TechAssists link to view the catalog and select a specific course.
- To launch a **Simulation (SIM)**, click on the Simulations link to view the catalog and select a diagnostic challenge simulation.

New Training

The following ACDelco training programs have recently been made available via the LMS:

S-AT02-01.01WBT – Automatic Transmissions

This web-based course provides an introduction to automatic transmissions, including automatic transmission specifications, powerflow through an automatic transmission, the characteristics of automatic transmission cases, the proper operation of torque converters, and the function of automatic transmission gear select indicators.

S-AT02-02.01WBT – Automatic Transmission Gearset

The characteristics and operation of planetary and differential gearsets are covered in this web-based course. Also reviewed in the course is the disassembly and assembly of gearsets as well as how to service differential gearsets.

S-AT02-03.01WBT – Automatic Transmission Mechanical Apply Components

This web-based course highlights the mechanical and apply components used in automatic transmissions. Topics covered include operation of the 1-2-3-4 clutch, characteristics of the 3-5 Reverse clutch, operation of the 4-5-6 clutch, characteristics of the 2-6 clutch, operation of the Low and Reverse clutch, and Low clutch sprag characteristics.

S-AT02-04.01WBT – Automatic Transmission Diagnosis

The processes and procedures for diagnosing automatic transmission concerns are discussed in this web-based course. It discusses the procedure for performing a preliminary inspection, the process for performing a road test, and the procedures used in post-road test diagnosis.

S-AT02-05.01WBT – Automatic Transmission Hydraulics and Electrical Systems

This web-based course covers the components and operation of the hydraulic system and the electronic controls that drive the hydraulic system, including the functions of the valves located in the fluid pump assembly, the valves located in the control valve body, and the solenoids contained in the solenoid control assembly. The characteristics of the electronic control module, the control module inputs, and the transmission adaptive functions also are reviewed.

Current Instructor-Led Training

ACDelco's Instructor-Led Training (ILT) courses provide hands-on instruction on the latest automotive systems. The following ILT courses are currently being held at training center locations around the country. Click the Schedule link on the LMS Menu to search the latest training schedule for courses held in your area.

Course Number	Course Name
S-AC07-02.01ILT	Automotive Air Conditioning: Advanced Refrigerant System Diagnostics
S-AC07-03.01ILT	HVAC Control System Operation and Diagnostics
S-AC07-06.01ILT	Toyota HVAC
S-AC07-07.01ILT	Chrysler HVAC
S-BK05-01.01ILT	Braking Systems
S-EL06-04.02ILT	Network Communication Diagnosis
S-EL06-10.02ILT	Electrical Power Management
S-EL06-11.01ILT	Automotive Electrical Circuit Diagnosis and Repair
S-EL06-12.01ILT	Hybrid Technology and Service
S-EP08-02.01ILT	Engine Performance: Computer Controls and Ignition System Diagnostics
S-EP08-03.01ILT	Engine Performance: Air Induction and Fuel System Diagnostics
S-EP08-04.01ILT	Engine Performance: Fault Monitoring and Emission System Diagnostics
S-EP08-05.01ILT	Engine Performance: Advanced Drivability Diagnostics
S-EP08-20.01ILT	Toyota Engine Performance
S-EP08-21.01ILT	Chrysler Engine Performance
S-EP08-81.01ILT	Duramax 6600: Diesel Engine Performance
S-SS04-01.01ILT	Vibration Correction Diagnostics
S-ST10-01.01ILT	Supplemental Restraint Systems

The Technical Side

It's almost time to Volt. **Chevy on the verge of introducing new propulsion technology.**



Chevrolet is banking on tens of thousands of customers casting their vote later this year in favor of the new Chevrolet Volt, the first Extended Range Electric Vehicle (E-REV) to be produced on a commercial scale.

It promises to be a big deal for GM, one that will vault the carmaker to the head of the class in the commercialization of green vehicle technology. Unlike hybrid electric vehicles that use gasoline and electrical systems, the E-REV Volt is powered solely by an electric motor. Its lithium-ion battery, designed to be recharged via a plug-in to the electrical grid or an on-board generator, powers the motor under all speeds and power levels for up to 40 miles.

After that, its gas-powered, range-extending generator automatically kicks in to provide electrical power. So Volt can go for several hundred additional miles, until you can plug it in or fill it up again.

Indeed, with the Volt, the battery is its main power source. The key to the technology is the sizing of the vehicle, battery and propulsion system so that vehicle operation is not dependent on the engine. In a hybrid, the engine is usually the larger of the two propulsion sources. It all adds up to a vehicle that takes energy savings and environmental friendliness to a new level – without a performance compromise.



Volt Links . . .

www.chevroletvolt.com

Go to the Chevy Volt Web site for the latest news.

www.chevroletvoltage.com

A way to connect with other electric vehicle enthusiasts.

www.facebook.com/chevroletvolt

With Facebook, you can join a community of Volt fans.

The 2010 75th Anniversary Diamond Edition Chevy Suburban



As the first vehicle in the industry to achieve 75 years in production, the 2010 75th Anniversary Diamond Edition Chevy Suburban will go on sale early this summer and is limited to 2,570 units.

It is distinguished by a White Diamond Tricoat exterior color and Cashmere interior, along with unique 20-inch chrome-clad wheels and new roof rack rails. Special badging adorns the C-pillar sail panel and steering wheel center cap, while "Diamond Edition" lettering is used on the sill plates and is embroidered on the front headrests.

The anniversary models are equipped with LTZ content and are offered in 1500 2WD or 4WD configurations.

The Technical Side (cont'd.)

From page 7, 75th Anniversary Suburban

The content of the 75th Anniversary Diamond Edition Suburban is unique, but it's built on a foundation of strength and capability that has propelled the brand for more than seven decades.

Available Powertrains

A Vortec 5.3L FlexFuel engine and fuel-saving six-speed automatic transmission are standard in Suburban half-ton models, enabling a maximum towing capacity of 8,100 pounds (2,674 kg). Suburban 2500 models offer a 6.0L/six-speed powertrain combination and a maximum towing rating of 9,600 pounds (4,354 kg). Also available is the Vortec 6.0L



Vortec 6.0L V-8 for the 2010 Chevy Suburban

V-8 with variable valve timing and E85 FlexFuel capability (2500 models). E85 comprises 85 percent ethanol and 15 percent gasoline, reduces greenhouse gas and smog-forming emissions, is domestically produced and helps reduce dependence on petroleum.



1935 Chevrolet Suburban

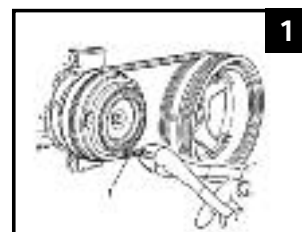
Repair Procedure for the 2010 Chevy Suburban

Even though the 2010 Chevy Suburban is a new vehicle, extensive service and repair information resources are a click away at www.gmtechinfo.com – *Electronic Service Information*. Technicians and shop owners can log on to the site to gain access to subscription services for service procedures and repair manuals. A complete Service Manual is accessible 24/7 through a subscription to the site. Free collision repair procedures will soon be available by going to www.genuinegmparts.com and clicking on *GM Technical Repair Information*.

This example of **Air Conditioning Compressor Belt Replacement (V8) and Drive Belt Replacement – Accessory** for the 2010 Chevy Suburban is just one of many found in the Service Repair Manual. By following the proper repair procedures, technicians can ensure that each vehicle maintains its solid performance and uncompromised safety features for the life of the vehicle.

Air Conditioning Compressor Belt Replacement (V8) Removal Procedure

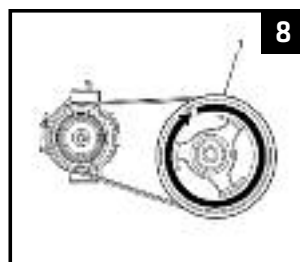
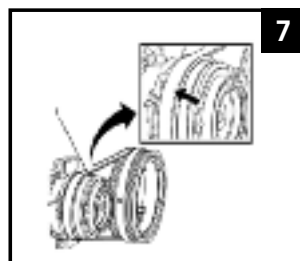
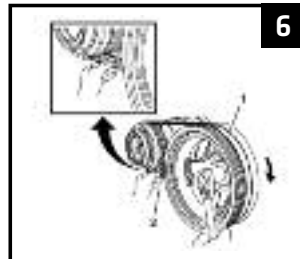
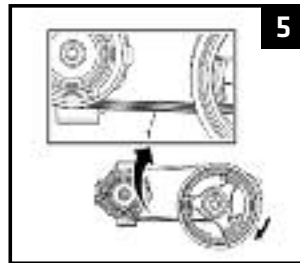
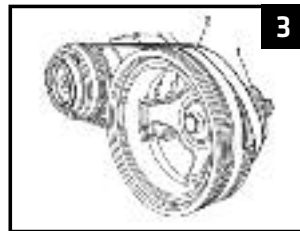
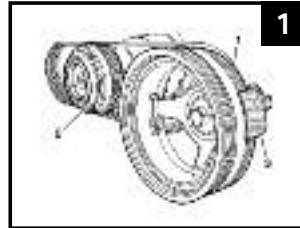
- 1** Remove the accessory drive belt. Refer to *Drive Belt Replacement – Accessory*.
- 2** Remove the skid plate. Refer to *Engine Shield Replacement*.
- 3** Cut the belt (1) from air conditioning (A/C) and crankshaft pulleys.



Installation Procedure

Note: The OEM replacement stretchy belt is packaged with a disposable installation tool.

- 1** Position the belt behind the rear face of the balancer (1) and off of the A/C pulley (2).
- 2** Install the belt installation tool (3) onto the balancer.
- 3** Slide the belt installation tool (1) upward, installing the belt (2) onto the belt installation tool.
- 4** Slide the belt installation tool downward, positioning the belt onto the A/C pulley, applying light tension to the belt.
- 5** Position the lower portion of the belt (1) with the ribbed area facing forward.
- 6** Slowly rotate the crankshaft pulley (1) in a clockwise direction while using finger pressure to pull the belt (2) forward. Ensure that the ribbed area of the belt remains facing forward and the belt aligns properly to the A/C pulley.
- 7** Inspect the drive belt (1) for proper installation and alignment.
- 8** Rotate the balancer (1) an additional 360 degrees to ensure proper belt installation.
- 9** Install the skid plate. Refer to *Engine Shield Replacement*.
- 10** Install the accessory drive belt. Refer to *Drive Belt Replacement – Accessory*.



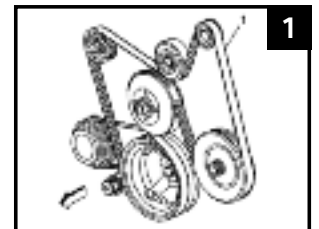
Drive Belt Replacement – Accessory

Removal Procedure

- 1** Remove the air cleaner outlet duct. Refer to *Air Cleaner Resonator Outlet Duct Replacement*.
- 2** Install a breaker bar with hex-head socket to the drive belt tensioner bolt.
- 3** Rotate the drive belt tensioner clockwise in order to relieve tension on the belt.
- 4** Remove the drive belt (1) from the pulleys and the drive belt tensioner.
- 5** Slowly release the tension on the drive belt tensioner.
- 6** Remove the breaker bar and socket from the drive belt tensioner bolt.
- 7** Clean and inspect the belt surfaces of all the pulleys.

Installation Procedure

- 1** Route the drive belt (1) around all the pulleys except the idler pulley.
- 2** Install the breaker bar with hex-head socket to the belt tensioner bolt.
- 3** Rotate the belt tensioner clockwise in order to relieve the tension on the tensioner.
- 4** Install the drive belt under the idler pulley.
- 5** Slowly release the tension on the belt tensioner.
- 6** Remove the breaker bar and socket from the belt tensioner bolt.
- 7** Inspect the drive belt for proper installation and alignment.
- 8** Install the air cleaner outlet duct. Refer to *Air Cleaner Resonator Outlet Duct Replacement*.
- 9** Start the vehicle and inspect the drive belt for proper operation. Close the hood.



Business of Repairs

Restorer, Suppliers Rally to Beat The Clock on '70 Chevelle SS Show Car Project

In 30 years of operating a custom hot rod and restoration business, Bob Janda has seen it all. Unusual requests, innovative applications and some pretty unrealistic deadlines. In March, he got all of that at the same time.

Janda's shop, Frame-Up Wheel Works, in Waukegan, Ill., had the honor – and the distinct challenge – of shepherding the resources needed to quickly outfit a show car with one of GM Performance Parts' revolutionary new E-ROD, emissions-compliant crate engines.

In less than three weeks, Janda had located a car, rounded up the necessary parts and marshaled the labor to do a job that might typically take three months. But at the end of the day, he had a glistening 1970 Chevrolet Chevelle outfitted with a ground-breaking "green" high-performance engine to show for his efforts.

And show it he did. The car, owned by Chuck Barnes, owner of Nostalgic Auto Body, in nearby Arlington Heights, Ill., made its date with the GM Performance Parts booth at the 13th Annual Hot Rod &

Restoration Trade Show in Indianapolis.

"Timing was the big thing on the project," he says. "Three weeks was a killer because I had just lost a guy and I was worried about getting all the parts we needed fast enough. But my employees came through and I was able to call in some favors from suppliers to get it done."

The E-ROD engine, a 6.2L LS3 rated at 430 hp, was the least of his challenges. It came from Gandrud Chevrolet, Janda's longtime GM Performance Parts supplier, in Green Bay, Wisc. The dealer's Chris Slack had approached Janda about doing the E-ROD job in time for the Indianapolis showing. Provided he could quickly find a car, Slack said Gandrud would supply the engine.

Within a day of lining up the car, a half-done project that had been languishing in Barnes' shop, Janda had the E-ROD engine. Over the next several days he contacted parts suppliers, but feared order backlogs would be a problem. Instead, they rallied to the cause, expediting the shipment of some \$40,000 worth of parts that would be needed to complete the project.



While the project was a push to complete, Janda says it wasn't due to technical problems related to the engine. It installed smoothly, requiring only minor work-arounds. The cross stock member had to be notched and reboxed for adequate oil pan clearance, motor mounts had to be tweaked and the transmission tunnel had to be refashioned for a new 5-speed manual transmission. "It was a mostly plug-and-play installation without a lot of fabrication needed," he says. "Once we got it completed it started right up and ran smoothly."



With the dealership graciously including the engine, he paid for the parts and Frame-Up's labor, but handled the E-ROD mint-green paint job himself.

With a package that includes a Keisler Engineering five-speed with a hydraulic clutch and drive shaft shifter, Detroit Speed rear suspension, Global West suspension control arms, Rock Valley stainless steel gas tank with an LS-style pump, an AutoRAD custom-built radiator, and a Vintage Air AC Climate System, the Chevelle is a standout example of what can be done with GM's new E-ROD engine.

For more pictures and information on the three week rebirth of the '70 Chevelle SS, go to frameupwheelworks.smugmug.com/Projects/Chuck-Barnes-E-Rod-1970.

Genuine  | Parts

Transfer Cases



GM Parts Transfer Cases are engineered to OEM specifications and updated to the latest specifications. It gives you assurance that your customer's GM Transfer Case is of the same quality as the one that came with their vehicle.

**3 Year / 100,000 Mile Warranty
includes Parts and Labor**

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Genuine  | **Parts**

**We're one stop. For your shop.
Genuine GM Parts Engines and
Transmissions. Plus, all the
associated parts you need.**

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*Give us a call for Genuine GM Powertrain
Parts and associated repair parts. All at one
convenient location.*



**Contact your
local
GM Dealer
for all of your
Parts needs.**

Genuine  | **Parts**

Remanufactured Automatic Transmissions



Each GM Remanufactured Automatic Transmission passes a series of rigorous tests before it goes into a GM vehicle. GM Remanufactured Transmissions are calibrated for a specific late-model GM vehicle to maintain its original performance.

- Up to 3-Year/100,000-mile transferable limited warranty
- Technology updated to latest GM standards
- Performance tested to ensure proper function

**GM Transmissions are time
and money savers with easy
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